

New Technique for the Evaluation of the Vertical Occlusal Dimension: The Interincisal Anatomical Assessment of VDO (IAA_VDO)

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Received: December 29, 2025; **Published:** February 24, 2026

Abstract

The evaluation of the vertical dimension of occlusion (VDO) continues to be a diagnostic challenge in restorative dentistry and oral rehabilitation. Traditional methods based on phonetics, swallowing, free functional space and cephalometry have limitations in terms of reproducibility and objectivity. This article proposes an objective clinical technique, the interincisal anatomical assessment of VDO (IAA_VDO), based on the anatomical measurement of the distance between the gingival zeniths of the upper and lower central incisors in maximal intercuspal position precisely of the enamel-cementum junction (UCA), considering the anatomical length of both crowns and the functional overbite. This technique, which is simple to apply, can be used in cases with structurally altered anterior dentition and provides an additional tool to validate the stability or alteration of the VDO.

Keywords: Vertical Dimension of Occlusion (VDO); Incisal Anatomical Assessment of VDO (IAA_VDO); Enamel-Cementum junction (UCA)

Introduction

According to the glossary of prosthodontic terms, the vertical occlusion dimension (VDO) is the distance between two selected anatomic or marked points (usually one on the tip of the nose and the other on the chin) when in maximal intercuspal position; syn, occlusal vertical dimension [1]. This concept does not specify the exact anatomical point that we should use as a reference, leaving a huge gap that can be interpreted in many ways, perhaps it is the reason why so far there is no consensus accepted by all.

Many authors continue to use old references as methods to evaluate the vertical dimension [2] and even when we rehabilitate dentate patients they continue to use references of the postural vertical dimension, which is a widely used reference for the manufacture of total prostheses [3]. But we know that in recent times there has been a drastic change in the patient who needs complete oral rehabilitation, before it was an older patient with few teeth and these teeth were very destroyed or with little periodontal support [4] but this situation is changing little by little each time patients wear their teeth and require a fixed rehabilitation [5] people have more and better knowledge about oral health and The influence on general health [6] that it is even very noticeable that many of the parents are looking for more prevention than intervention in their children [7].

One of the consequences at the level of the teeth that the patient is suffering today is due to the excessive consumption of a very acidic diet, carbonated drinks or energy drinks [8] and another large group suffers from gastric reflux for multiple reasons [9]. These extrinsic and extrinsic factors are producing an accelerated wear of the teeth, we have references that the enamel of the teeth has an average annual wear under normal conditions that is 10 μm to 30 μm per year [10,11] means that a patient over 60 years of age would have a decrease in the VDO due to the normal functions of the teeth such as chewing, swallowing and phonetics produced wear, dentin exposure, crowding, extrusions, depletion of the gingival zeniths and decrease of the lower third of the face, such a situation could be said to be signs of aging but not of a pathological entity if these signs are not accompanied by symptoms [12]. But what is happening today is that young or young adult patients are suffering accelerated wear of the teeth that, according to data from the specialized literature, these wear and tear are close to up to 70 μm to 265 μm per year [13], for such a reason that today we could say that there is a real alteration of the vertical occlusal dimension at an early age (Figure 1a and 1b).



Figure 1a and 1b: 1a: Patient presenting with clinical indications for conventional oral rehabilitation and 1b: Patient presenting with clinical indications for adhesive oral rehabilitation with an increased vertical dimension of occlusion (VDO).

That is why the objective of this article is to have an easier, faster and simpler method applicable to young people since their wear is accelerated and does not give time to processes such as altered passive eruption (APE) [14].

Theoretical foundation and description of the technique

The vertical dimension of occlusion (VDO) is a key structural measure in the diagnosis and planning of restorative and prosthetic treatments [15]. Its alteration can compromise the function, aesthetics and stability of treatments [16]. Despite its importance, the accurate clinical determination of VDO remains a challenge [17]. Classical methods include the analysis of free functional space, mandibular resting position, phonetics and cephalometric references, all with a certain degree of subjectivity or variability [18]. Regarding clinical management, multiple clinical techniques have been described in the literature, each supported by the author's clinical philosophy and experience; however, not all techniques are mandatory or intended to be applied simultaneously [19] but what we can be sure of today is that the increase in this altered VDO can be up to 5 mm [20] without the patient being able to present any discomfort but the authors recommend waiting up to 2 weeks to be sure that the system was adapted to this new VDO [21] and the literature is clear that the increase in the VDO does not cause any alteration at the level of the temporomandibular joint [22]. But what no one refers to is how we could be sure of this new VDO proposal? The literature refers to clinical signs [23], all subjective but few objective [24]. Faced with this situation, this article proposes an objective technique based on measurable and constant dental anatomical parameters in the greatest number of people [25]: the interincisal anatomical assessment of VDO (IAA_VDO).

Under ideal anatomical conditions, the sum of the clinical length of the upper central incisors (LCS) and lower incisors (LCI) minus the functional overbite (OB) should reflect the actual vertical distance between gingival zeniths, or otherwise the cement enamel junction at maximal intercuspal position (Figure 2a and 2b)



Figure 2a and 2b: Patient exhibiting ideal clinical conditions in the absence of signs and symptoms and 2b: Patient presenting with occlusal stability.

The proposed formula is: (Graphic interincisal)

(LICS + LICI) - OB = IAA_VDO

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LICS = Length of the Upper Central Incisor .
 LICI = Length of the lower central incisor .
 OB = Over Bite .
 IAA = Interincisal Anatomical Assessment .
 VDO = Vertical Dimension of Occlusion .

Image

For example, if an upper central incisor measures 10 mm (Figure 3a), the lower 8 mm (Figure 3b) and the overbite is 2 mm (Figure 4), the zenith to zenith distance will be: IAA-VDO = 10 + 8 - 2 = 16 mm (Figure 5 and 6).



Figure 3a and 3b: 3a: Length of the maxillary central incisor. 3b: Length of the mandibular central incisor.



Figure 4: Average overbite.

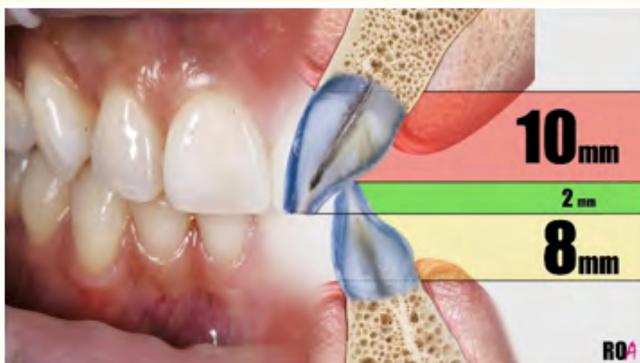


Figure 5: IAA_VDO.



Figure 6: Result of the IAA_VDO equation.

This value is considered a physiological range in young adult patients without wear, migration, extrusion or invasive restorations in the anterior sector [26].

Theoretical clinical application

This technique can be used in young patients with intact anterior dentition to confirm that their VDO is correct, it can help us in the diagnosis to confirm that the patient does have an alteration of the VDO and especially during planning such as aesthetic mock-ups, provisionalization, digital wax-ups or analog planning wax-ups because such proposals must meet the ideal parameters so all should measure 16 mm at maximal intercuspal position. It can also be useful as a structural validation criterion to confirm if there is anterior vertical collapse due to wear or if the VDO is structurally preserved.

The use of the technique would be limited for cases with severe wear combined with APE, compensatory extrusion, anterior tooth loss or altered gingival margins, for such cases we will publish a second part.

Discussion

The IAA-VDO does not intend to replace the classic methods of evaluation of the VDO, but to complement them with an objective, quantifiable and anatomically grounded tool. Unlike phonetic techniques [27], craniometric [28] or cephalometric [29]. Reviewing the literature there is only one reference that uses the dental measurements in the way we are proposing [30] but Dr. Hank Shimbashi's proposal was 18 mm as the total sum of the incisors and this measurement is very far from the measurement of the teeth that we have found, they have tried to use the Shimbashi measurement in different articles [31] but all the results are very distant from his proposal so we suggest not using it or using it carefully [32]. Our proposal is a measurement that is based on fixed structures that are the teeth, and allows reproducibility. In addition, it can be easily integrated into digital workflows with intraoral scanners and CAD software [33]. However, additional clinical validation and population studies are required to establish more precise and adaptable physiological ranges to different biotypes.

Conclusion

The Interincisal Anatomical Assessment of VDO (IAA_VDO) $(10 + 8) - 2 = 16$ mm is a novel proposal that allows estimating the anterior vertical dimension by means of objective dental morphological parameters. It can be especially useful in young patients, with intact anterior teeth and without gingival or migratory alterations. Its implementation can improve diagnostic accuracy and restorative predictability in cases where the need to modify or preserve the VDO is evaluated. The use in digital or analogue planning is really innovative since all proposals must be waxed in the previous sector must measure 16 mm.

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Volume 25 Issue 3 March 2026

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